We claim:

1. An isolated nucleic acid molecule comprising a nucleotide sequence encoding human LMP, wherein the nucleic acid molecule hybridizes under standard conditions to a nucleic acid molecule complementary to the full length of SEQ. ID NO: 25, and wherein the molecule hybridizes under highly stringent conditions to a nucleic acid molecule complementary to the full length of SEQ. ID NO: 26.

2. The isolated nucleic acid molecule according to claim 1, wherein the isolated nucleic acid molecule is HLMP-1s which comprises SEQ ID NO: 33.

3. The isolated nucleic acid molecule according to claim 1, wherein the isolated nucleic acid molecule is HLMP-1 which comprises SEQ ID NO: 22.

4. A human LMP protein encoded by an isolated nucleic acid molecule, wherein the nucleic acid molecule hybridizes under standard conditions to a nucleic acid molecule complementary to the full length of SEQ. ID NO: 25, and wherein the molecule hybridizes under highly stringent conditions to a nucleic acid molecule complementary to the full length of SEQ. ID NO: 26.

5. The human LMP protein according to claim 4, comprising the amino acid sequence of SEQ ID NO: 34.

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6. An isolated nucleic acid molecule comprising a nucleotide sequence encoding rat LMP protein, wherein the isolated nucleic acid molecule hybridizes under standard conditions to a nucleic acid molecule complementary to the full length of SEQ. ID NO: 2.

7. A rat LMP protein encoded by an isolated nucleic acid molecule, wherein the isolated nucleic acid molecule hybridizes under standard conditions to a nucleic acid molecule complementary to the full length of SEQ. ID NO: 2.

8. A vector comprising the isolated nucleic acid molecule of any of claims 1, 2, 3 or 6.

9. A host cell comprising the vector of claim 8, wherein the host cell is selected from the group consisting of procaryotic cells, yeast cells and mammalian cells.

10. The isolated nucleic acid molecule of any of claims 1, 2, 3 or 6, further comprising a label for detection.

11. A human LIM mineralization protein comprising an amino acid sequence selected from the group consisting of SEQ ID NO: 10 and SEQ ID NO: 34.

12. A rat LIM mineralization protein comprising the amino acid sequence of SEQ ID NO: 1.

13. An osteoinductive soluble factor induced by the expression of human LIM mineralization protein.

14. The osteoinductive soluble factor of claim 13, wherein the osteoinductive soluble factor is a protein.

15. A monoclonal antibody specific for a human LIM mineralization protein.

16. The monoclonal antibody of claim 15, wherein the human LIM mineralization protein is HLMP-1 (SEQ ID NO: 10).

17. The monoclonal antibody of claim 15, wherein the human LIM mineralization protein is HLMP-1s (SEQ ID NO: 34).

18. A polyclonal antibody specific for a human LIM mineralization protein.

19. The polyclonal antibody of claim 18, wherein the human LIM mineralization protein is HLMP-1 (SEQ ID NO: 10).

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20. The polyclonal antibody of claim 18, wherein the human LIM mineralization protein is HLMP-1s (SEQ ID NO: 34).

21. A monoclonal antibody specific for a rat LIM mineralization protein (SEQ ID NO: 1).

22. A polyclonal antibody specific for a rat LIM mineralization protein (SEQ ID NO: 1).

23. A method of inducing bone formation comprising transfecting osteogenic precursor cells with an isolated nucleic acid molecule comprising a nucleotide sequence encoding LIM mineralization protein.

24. The method of claim 23, wherein the isolated nucleic acid molecule is in a vector.

25. The method of claim 24, wherein the vector is an expression vector.

26. The method of claim 25, wherein the vector is a plasmid.

27. The method of claim 25, wherein the vector is a virus.

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28. The method of claim 27, wherein the virus is an adenovirus

29. The method of claim 27, wherein the virus is a retrovirus.

30. The method of claim 23, wherein the osteogenic precursor cells are transfected *ex vivo*.

31. The method of claim 23, wherein the osteogenic precursor cells are transfected *in vivo* by direct injection of the isolated nucleic acid molecule.

32. The method of claim 23, wherein the LIM mineralization protein is HLMP-1 (SEQ ID NO: 10).

33. The method of claim 23, wherein the LIM mineralization protein is HLMP-1s (SEQ ID NO: 34).

34. The method of claim 23, wherein the LIM mineralization protein is RLMP (SEQ ID NO: 1).

35. A method of fusing a spine, comprising:

(a) transfecting osteogenic precursor cells with an isolated nucleic acid molecule comprising a nucleotide sequence encoding LIM mineralization protein;

(b) admixing the transfected osteogenic precursor cells with a matrix; and

(c) contacting the matrix with the spine;

wherein expression of the nucleotide sequence encoding LIM mineralization protein causes mineralized bone formation in the matrix.

36. The method of claim 35, wherein the osteogenic precursor cells are transfected *ex vivo*.

37. The method of claim 35, wherein the LIM mineralization protein is selected from the group consisting of HLMP-1 (SEQ ID NO: 10), HLMP-1s (SEQ ID NO: 34) and RLMP (SEQ ID NO: 1).

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38. A method of inducing systemic bone formation in a mammalian host in need thereof, comprising:

(a) transfecting osteogenic precursor cells with a vector that is stablely maintained in the osteogenic precursor cells, the vector comprising a nucleotide sequence encoding a LIM mineralization protein and a regulatable promoter, wherein the regulatable promoter, which responds to an exogenous control compound, controls expression of the nucleotide sequence encoding the LIM mineralization protein; and

(b) administering to the host, as needed, an amount of the exogenous control substance effective to cause expression of the nucleotide sequence encoding a LIM mineralization protein.

39. The method of claim 38, wherein the LIM mineralization protein is selected from the group consisting of HLMP-1 (SEQ ID NO: 10), HLMP-1s (SEQ ID NO: 34) and RLMP (SEQ ID NO: 1).

40. A method of stimulating production of an osteogenic soluble factor by an osteogenic cell, comprising:

(a) transfecting the osteogenic cell with an isolated nucleic acid molecule comprising a nucleotide sequence encoding LIM mineralization protein; and

(b) overexpressing the isolated nucleic acid molecule.

41. An osteogenic soluble factor produced by the method of claim 40.

42. The osteogenic soluble factor of claim 41, wherein the osteogenic factor is a protein.

43. A method of inhibiting the expression of LIM mineralization protein comprising transfecting a cell wherein the LIM mineralization protein is expressed with an antisense oligonucleotide.

44. The method of claim 43, wherein the antisense oligonucleotide has the nucleotide sequence set forth in SEQ ID NO: 35.

45. An isolated nucleic acid molecule comprising a nucleotide sequence encoding human LMP, wherein the nucleic acid molecule hybridizes under standard conditions to a nucleic acid molecule complementary to the full length of SEQ. ID NO: 25.

46. An isolated nucleic acid molecule comprising a nucleotide sequence encoding human LMP, wherein the nucleic acid molecule hybridizes under highly stringent conditions to a nucleic acid molecule complementary to the full length of SEQ. ID NO: 26.

47. The method of claim of claim 31, wherein the isolated nucleic acid molecule is in a vector selected from the group consisting of a plasmid and a virus.

48. The method of claim 47, wherein the vector is a plasmid, which plasmid is directly injected into muscle tissue.